

Math 3322 Quiz III
DeMaio Fall 2008

Name _____

Instructions. Show all your work. Credit cannot and will not be awarded for work not shown. Where appropriate, simplify all answers to a single decimal expansion.

1. (15 points) Let $g_0 = 1$. Let $g_n = 2^{g_{n-1}}$ for $n \geq 1$. Compute g_1, g_2, g_3 and g_4 .
2. (10 points) Give a recursive definition of the set of positive integer powers of 5.
3. (10 points) State the recursive definition of the Fibonacci sequence.
4. (10 points) Complete the table of Fibonacci numbers.

n	0	1	2	3	4	5	6	7	8	9	10
f_n											

5. (15 points) There are n chairs and some collection of people (including none) will sit in the seats but there will always be at least one empty chair between any two people. Let A_n be the number of antisocial ways to seat some number of people in these n seats as described. Construct all possible arrangements and compute A_n for all values up to $n = 3$. Find and prove the correctness of a formula for A_n .

6. (15 points) Use induction to prove $\sum_{i=1}^n f_i^2 = f_n f_{n+1}$ for the Fibonacci sequence and $n \in \mathbb{Z}^+$.
7. (5 points) How many bit strings of length 6 exist?
8. (5 points) How many bit strings of length 6 exist that end and begin with 0?
9. (5 points) Consider a twenty person club. How many different ways can a President, Vice-President and Treasurer be elected?
10. (5 points) Consider the twenty person club made up of eight men and twelve women. How many ways can a President and Vice-President of opposite gender must be selected?
11. (5 points) A theater concession counter offers four different sizes of drinks and eight different choices of beverages. How many different ways can a drink be ordered?
12. (5 points each) Two married couples, two single men and one single woman sit in a row of seven consecutive seats. How many ways can they be seated
- with no restrictions;
 - alternating genders;
 - such that the women are all consecutive;
 - such that spouses sit next to one another?